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Spruce Budworms Situation in North America 1982

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**Spruce Budworms Situation
in North America 1982 [1-4]**

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**by Daniel R. Kucera¹ and
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2 In 1982, the spruce budworms again had a significant impact on large forest areas in North America. In the East, visible defoliation of balsam fir and spruces occurred on more than 20.5 million hectares (ha).³ In the West, visible defoliation more than doubled, covering almost 3.6 million ha. Tree mortality increased markedly in the Western States, in Maine and Vermont in the Eastern United States, and in Quebec in Canada.

In the East, balsam fir is the preferred host, followed to a lesser extent by red spruce, white spruce, and black spruce. In the West, Douglas-fir is preferred, along with subalpine fir, white fir, Engelmann spruce, Colorado blue spruce, and lodgepole and ponderosa pines. In the eastern forests, significant areas of balsam fir have been killed; and red spruce is now beginning to die, as are less preferred species

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³ To convert hectares to acres, multiply by 2.5.

such as eastern hemlock. In some areas, populations of other insects such as bark beetles have also increased rapidly in stands weakened by repeated budworm defoliation, thus adding to the damage.

Cooperative Federal/State or Provincial aerial treatment operations were carried out on almost 3.5 million ha in Newfoundland, Nova Scotia, New Brunswick, Quebec, Ontario, Maine, New Mexico, and Oregon during 1982. An additional 12,000 ha in Maine were treated by private landowners, and another 7,000 ha of Indian reservation lands in Maine were treated by the U.S. Department of the Interior.

This publication gives information on the spruce budworms situation in 1982, suppression projects undertaken in 1982, and the outlook for 1983 for both Canada and the United States. The Canadian information was provided by the Provincial governments of Newfoundland, Nova Scotia, Prince Edward Island, New Brunswick, Quebec, Ontario, Manitoba, and British Columbia and coordinated by Environment Canada, Canadian Forestry Service. Forest Protection Limited also provided information. U.S. information was provided by the State governments of Maine, New Hampshire, Vermont, Wisconsin, Minnesota, and Michigan; Forest Service Regions 1 through 6 and 10; and Northeastern Area State and Private Forestry field offices in St. Paul, Minn., and Durham, N.H. U.S. information was coordinated by the U.S. Department of Agriculture, Forest Service.

Eastern and Prairie Provinces

Newfoundland.—The total area of moderate to severe defoliation caused by the spruce budworm (*Choristoneura fumiferana* (Clemens)) continued to decrease dramatically, from 380,000 ha in 1981 to 41,820 ha in 1982. This reduction was caused, in part, by a combination of unusual weather conditions. The area of merchantable stands with dead trees increased to 578,000 ha in 1982.

Nova Scotia.—Moderate to severe defoliation occurred over 173,000 ha, a decrease from the almost 600,000 ha defoliated in 1981. It must be noted, however, that the area of dead and dying trees is estimated to be 725,000 ha. Most of this land is on Cape Breton Island.

Prince Edward Island.—The area of moderate to severe defoliation decreased from 133,000 ha in 1981 to 13,100 ha in 1982. The area that includes dead and dying trees is about 30,000 ha.

New Brunswick.—The area of moderate to severe defoliation remained at 1.2 million ha in 1982. From the outbreak to the end of 1982, about 2.5 million cubic meters (88.3 million cubic feet) of fir and spruce died as a result of repeated defoliation.

Quebec.—The area of moderate to severe defoliation increased to 8.0 million ha in 1982, and the area within which dead or dying trees occurred increased to about 11.2 million ha.

Ontario.—In 1982, the area of moderate to severe defoliation was 8.0 million ha, down significantly from the previous year. However, the areas within which tree mortality occurred increased to 11.6 million ha.

Prairie Provinces.—The spruce budworm caused moderate to severe defoliation of balsam fir and spruce over an area of 4,900 ha in eastern Manitoba in 1982. The infestation is expected to expand in 1983 and cause defoliation on over 6,000 ha. No control operations were carried out in 1982.

There also were small localized areas of infestation elsewhere in the Prairie Provinces and in the Northwest Territories in 1982.

Eastern United States

New England.—In 1982, the spruce budworm defoliated 3,040,000 ha in the New England area or 1,365,000 ha more than in 1981. This included 21,000 ha of Passamaquoddy and Penobscot Indian lands in Maine. In both Vermont and Maine, the total area defoliated and tree mortality increased sharply. Maine recorded 2,976,000 ha of defoliation. Vermont recorded 60,000 ha of defoliation, with 35,000 ha having some tree mortality. In Vermont, more than 6,000 ha are now in the 25-percent-or-more-dead category. Timber loss in Vermont exceeded \$2 million in 1982 and is expected to continue at that rate in 1983. In 1982, New Hampshire experienced a decline in both areas defoliated (16,000 ha) and areas with tree mortality (5,000 ha). However, tree mortality on the 5,000 ha exceeds 50 percent.

Lake States.—Defoliation of balsam fir and white spruce by spruce budworm occurred on 99,000 ha. This is a decrease from 1981 and a much more significant decrease from 1980 when 520,000 ha were defoliated. All defoliation was in the very light to moderate categories except in Minnesota, where 20,000 ha were heavily defoliated.

During the 1974-81 budworm outbreak in Minnesota and on the National Forests in Michigan and Wisconsin, tree mortality occurred on 420,000 ha. A survey is being made to determine the volume of timber killed during this outbreak.

Western Provinces

British Columbia.—The area of defoliation of Douglas-fir by the western spruce budworm (*Choristoneura occidentalis* Freeman) decreased in 1982; light defoliation was recorded on 17,000 ha, down from 21,000 ha in 1981.

The 2-year-cycle budworm (*Choristoneura biennis* Freeman) caused defoliation of alpine fir and white spruce over 90,000 ha in the Prince Rupert Region.

Western United States

Budworm activity again increased in extent and intensity. Defoliation increased markedly in Montana, Oregon, California, Utah, Wyoming, and Idaho. For the first time in several years, budworm activity increased in northern California. Defoliation recorded by Forest Service Regions was as follows:

Northern Region (R-1).—Total defoliation caused by the western spruce budworm increased in extent and intensity during 1982--the second straight year--to 914,000 ha (versus 377,000 in 1981). The total defoliation is more than four times the amount reported in 1980 and the third largest increase ever recorded. Increases occurred on all but two National Forest areas. The largest increase occurred on the Bitterroot National Forest, where defoliation increased from 2,000 ha in 1981 to 158,000 in 1982. Defoliation in Montana is expected to increase again in 1983.

Rocky Mountain Region (R-2).—The western spruce budworm continues to be the most important defoliator in the Rocky Mountain Region. The current outbreak has been underway since the early 1970's. The area of visible defoliation decreased slightly from 890,000 ha in 1981 to 810,000 ha in 1982, with most of the decline along the Colorado Front Range. However, the Shoshone National Forest in western Wyoming experienced very severe defoliation on 74,000 ha in 1982. Heavy defoliation is predicted for even larger areas in Wyoming during 1983.

Southwestern Region (R-3).—Defoliation of spruce, Douglas-fir, and true firs decreased slightly from 194,000 ha in 1981 to 138,000 ha in 1982. Areas with the most extensive defoliation included the Carson, Santa Fe, and Cibola National Forests in New Mexico and the Kaibab National Forest and Grand Canyon National Park in Arizona. Defoliation within areas that are currently infested is expected to continue at similar or slightly decreased levels in 1983.

Intermountain Region (R-4).—Visible defoliation increased in Utah, Wyoming, and southern Idaho from 572,000 ha in 1981 to 1,013,000 ha in 1982. Moderate to heavy defoliation alone encompassed 567,000 ha. Budworm populations increased on all National Forests in southern Idaho. In Utah and Wyoming, the western spruce budworm defoliated 101,000 ha of Douglas-fir, subalpine fir, and white fir, a twofold increase from 1981. Increases were greatest on the Bridger-Teton National Forest in Wyoming and the Dixie National Forest in Utah.

Pacific Southwest Region (R-5).—A newly identified species (*Choristoneura carmana californica* Powell) of budworm defoliated Douglas-fir on 2,200 ha in Trinity County, Calif. This is only the second known report of defoliation by this insect and the first that covers such an extensive area. Ground surveys detected this insect on an additional 13,500 ha, but not at populations high enough to cause defoliation.

Pacific Northwest Region (R-6).—In Oregon, the area of visible defoliation increased from 127,000 ha in 1981 to more than 606,000 ha in 1982. This increase was on the Malheur, Ochoco, Umatilla, and Wallowa-Whitman National Forests and adjoining State, private, and Bureau of Land Management properties. An environmental analysis is being conducted to determine possible management actions for 1983.

In the State of Washington, western spruce budworm populations declined on the Okanogan National Forest and vicinity from 12,000 ha in 1981 to 3,000 ha in 1982.

Alaska Region (R-10).—In Alaska, results of ground surveys showed little visible damage due to budworm on white spruce in either the Anchorage or Fairbanks area. The 1981 defoliation (2,710 ha between Copper Center and Chitina) was not evident in 1982.

Budworm life history and pheromone studies continued throughout 1982 in cooperation with the Canadian Forestry Service. These studies support the opinion that the Alaska budworm closely resembles *Choristoneura orae* Freeman or is a new species. Efforts are continuing to delineate the range of this new budworm.

SUMMARY OF SUPPRESSION PROJECTS

Eastern Provinces

Newfoundland.—The Department of Forest Resources and Lands continued chemical control operations this year. Matacil was used to treat 47,834 ha.

Nova Scotia.—The Department of Lands and Forests treated 19,159 ha of high-value stands with *Bacillus thuringiensis* Berliner (B.t.).

New Brunswick.—In 1982, about 1.7 million ha of forest were treated with fenitrothion by Forest Protection Limited.

Quebec.—The Department of Energy and Resources treated 1,185,290 ha. Of that, 1,158,684 ha were treated with chemicals, 80 percent with Matacil and 20 percent with fenitrothion. B.t. was applied to the remainder.

Ontario.—In 1982, aerial spray operations covering 3,454 ha were conducted by the Ontario Ministry of Natural Resources. Areas sprayed included commercial forests, seed production areas, Provincial parks, plantations, and a moose yard. Material used included B.t., aminocarb, and acephate.

Eastern United States

New England States.—The 1982 Maine Forest Service spruce budworm suppression program began on May 21 and ended on June 15. A total of 332,121 ha was treated, mostly with chemical insecticides (296,000 ha). About 36,000 ha were treated with B.t., and 81,000 ha were treated silviculturally. Results showed a high degree

of foliage protection in nearly all spray blocks with all materials used. In spite of poor market conditions, about 2.6 million cubic feet of wood were utilized from infested areas. An additional 210,000 board feet of sawtimber and 4,152 cords of pulpwood were removed in the silvicultural operations to improve stand resistance to damage.

In addition to the cooperative State/Federal project, private landowners treated approximately 12,000 ha with aminocarb; and the Penobscot and Passamaquoddy Indians, with technical assistance from the Forest Service, treated 7,000 acres with B.t.

Lake States.—Although there were no suppression projects in the Lake States, the Canada/United States Spruce Budworms Program (CANUSA) sponsored a field experiment, which was conducted by the Pacific Southwest Forest and Range Experiment Station on about 405 ha in Michigan. The objective was to compare the efficacy of three different dosage rates of B.t. (Thuricide 24B), each applied at two volume rates, against spruce budworm. This field experiment was replicated in Vermont, Maine, and Ontario, Canada. Results will be determined at the end of the 1983 growing season.

Western United States

Southwestern Region (R-3).—In 1982, a western spruce budworm suppression project was conducted with the New Mexico Departments of Agriculture and Natural Resources using Sevin 4 Oil and B.t. Approximately 13,000 ha of private lands were treated. An additional 15,000 ha of National Forest lands were treated. Prespray larval

densities ranged from 21 to 28 larvae per 100 buds, and postspray densities ranged from 1 to 7 larvae per 100 buds, resulting in 82-percent average larval mortality. Although defoliation of current year needles was not measured, no visible defoliation was observed during aerial surveys of the treated areas. Considerable defoliation occurred in the untreated areas.

Pacific Northwest Region (R-6).—The USDA Forest Service and the Oregon State Department of Forestry treated 72,250 ha in 1982. Of this total, 68,618 ha were treated with carbaryl and 3,642 with acephate. Effectiveness evaluations indicated 84- to 90-percent larval mortality in the carbaryl-treated blocks and 81-percent larval mortality in the acephate-treated blocks. Some 95-percent defoliation occurred in untreated areas versus 52-percent defoliation in the carbaryl-treated areas. Defoliation was not measured in the acephate-treated areas.

Canada

Newfoundland and Nova Scotia are predicting increases in areas of infestation to 110,000 ha and 600,000 ha, respectively. Defoliation is expected to increase to 50,000 ha on Prince Edward Island.

New Brunswick and Quebec are predicting large increases to 5.3 million ha and 21 million ha, respectively. Ontario is predicting a slight decrease to 8.0 million ha.

In British Columbia, the western spruce budworm will maintain areas of light infestation.

United States

In 1983, outbreaks will be more intense and widespread in most Western States. Defoliation will increase markedly in southwestern Montana and in Yellowstone National Park. Although the outbreak is expected to decline slightly in Region 3, a spray project on about 24,000 ha is being considered in 1983. In Region 4, outbreaks are expected to increase in extent and intensity of defoliation in southern Idaho, Utah, and Wyoming. The infestation is also expected to increase substantially in California. In eastern Oregon, there is the potential for widespread defoliation on more than 725,000 ha in 1983.

In the Eastern United States, there was a slight reduction in the moderate-to-severe-defoliation class compared with 1981. In Maine, heavy defoliation is expected in the northwestern and southeastern portion of the State. In addition,

heavy defoliation is expected in southwestern Maine in the Rangely area. Spruce mortality is expected to increase sharply, especially in unprotected or unsprayed areas such as buffer strips. Trees in extreme to high-hazard condition are expected to remain in this category on over 1.8 million ha in 1983. An estimated 0.2 to 0.4 million ha will probably be treated during 1983. The defoliation forecast for Vermont in 1983 is 61,000 ha, an area larger than in any previous years except 1982. In New Hampshire, a slight decrease is expected in 1983. This is the third year of decline in New Hampshire.

Defoliation in the Lake States seems to be on the decline except in Minnesota, which anticipates defoliation on more than 81,000 ha. Timber mortality is expected to continue in Minnesota, Michigan, and Wisconsin.



Table 1.--Summary of 1982 spruce budworm defoliation, tree mortality, suppression, and forecast for 1983, Eastern United States and Canada

Province or State	1982			Predicted defoliation and trend in 1983
	Area of visible defoliation	Area with dead and dying trees	Area treated	
	<u>1,000 hectares</u>			
Prairie Provinces	5	0	0	6 + ¹
Newfoundland	42	578	48	110 +
Nova Scotia	173	725	19	600 +
Prince Edward Island	13	30	0	50 +
New Brunswick	1,202	1,000	1,725	5,300 +
Quebec	8,000	11,190	1,185	21,000 +
Ontario	8,023	11,634	3	8,000 - ²
Eastern Canada	17,458	25,157	2,980	-- ³
Maine	2,976	219	351	2,226 ⁴ -
New Hampshire	4	.8	0	8 +
Vermont	60	35	0	61 -
Wisconsin	1	20	0	0 -
Minnesota	51	75	0	72 +
Michigan	47	325	.4 ⁵	20 -
Eastern United States	3,139	674.8	351.4	--
Total	20,597	25,831.8	3,331.4	--

1 + = increase in defoliation.

2 - = decrease in defoliation.

3 -- = not applicable.

4 Heavy defoliation only.

5 Pilot control project by Pacific Southwest Forest and Range Experiment Station in cooperation with CANUSA East.

Table 2.--Summary of 1982 western spruce budworms¹ defoliation, tree mortality, suppression, and forecast for 1983, Western United States and Canada

Province or Forest Service Region (States)	1982		Area treated	Predicted defoliation and trend in 1983
	Area of visible defoliation	Dead and dying trees reported ²		
			<u>1,000 hectares</u>	
British Columbia				
(<u>C. occidentalis</u>)	17	No	0	- ³
(<u>C. biennis</u>)	90			
Northern Region (Mont., northern Idaho, northwestern Wyo.)	914	Yes	0	+ ⁴
Rocky Mountain Region (Colo., Wyo.)	810	Yes	0	-
Southwestern Region (Ariz., N. Mex.)	138	Yes	28	-
Intermountain Region (Utah, Nev., central Idaho, Wyo.)	1,013	Yes	0	+
Pacific Southwest Region (Calif.)	2	No	0	16 +
Pacific Northwest Region (Oreg., Wash.)	609	Yes	72	727 +
Alaska Region	0	No	0	-
Total	3,593	-- ⁵	100	--

¹ In addition to the western spruce budworm, C. biennis defoliated about 90,000 ha in the Prince Rupert Region and C. cagnana californica about 2,000 acres in northern California.

² Acres of dead and dying trees not determined.

³ - = decrease in defoliation.

⁴ + = increase in defoliation.

⁵ -- = not applicable.

Table 3.--Trend of defoliation caused by spruce budworms (Choristoneura spp.) in North America

Province, State or Forest Service Region	1981	1982	Trend
	<u>1,000 hectares</u>		
Prairie Provinces	0	5	5 + ¹
Newfoundland	380	42	338 - ²
Nova Scotia	567	173	395 -
Prince Edward Island	133	13	120 -
New Brunswick	1,220	1,202	18 -
Quebec	16,500 ³	8,000 ⁴	-- + ⁵
Ontario	18,200	8,023	10,177 -
Eastern Canada	37,000	17,458	-- ⁶
Maine	1,620	2,976	1,356 -
New Hampshire	17	4	13 -
Vermont	38	60	22 +
Michigan	65	47	18 -
Minnesota	45	51	6 +
Wisconsin	34	1	33 -
Eastern United States	1,819	3,139	--
British Columbia	21	107	86 +
Western Canada	21	107	--
Northern Region	377	914	537 +
Rocky Mountain Region	890	810	94 +
Southwestern Region	194	138	56 -
Intermountain Region	572	1,013	441 +
Pacific Southwest Region	0	2	2 +
Pacific Northwest Region	139	609	471 +
Western United States	2,172	3,486	--
Total	40,012	24,190	--

1 + = increase in defoliation.

2 - = decrease in defoliation.

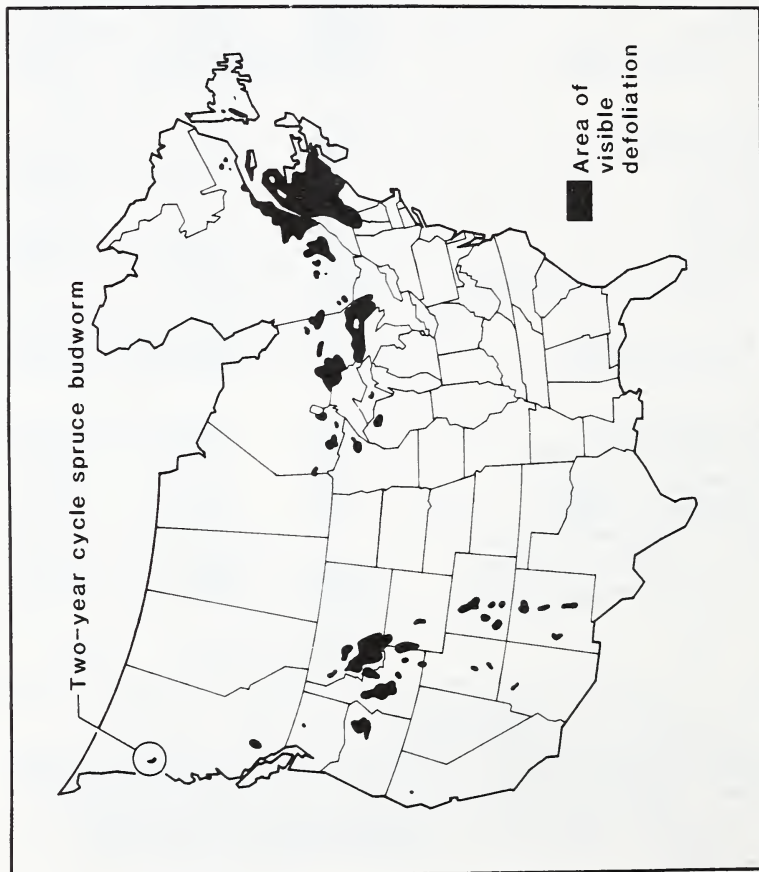
3 This figure includes an estimate of areas of dead trees as well as areas of defoliation.

4 The 1982 figure represents areas of defoliation only.

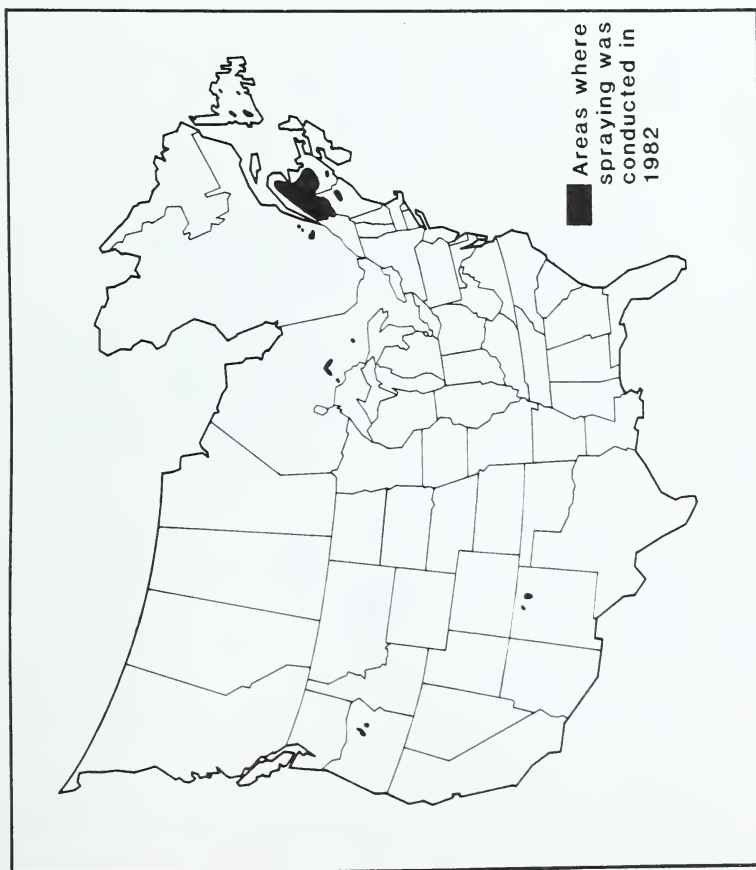
5 Trend was increased, but the magnitude could not be determined.

6 -- = not applicable.

Areas within which visible defoliation by the spruce budworm and western spruce budworm occurred in 1982.



Areas where spraying was conducted in 1982.



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